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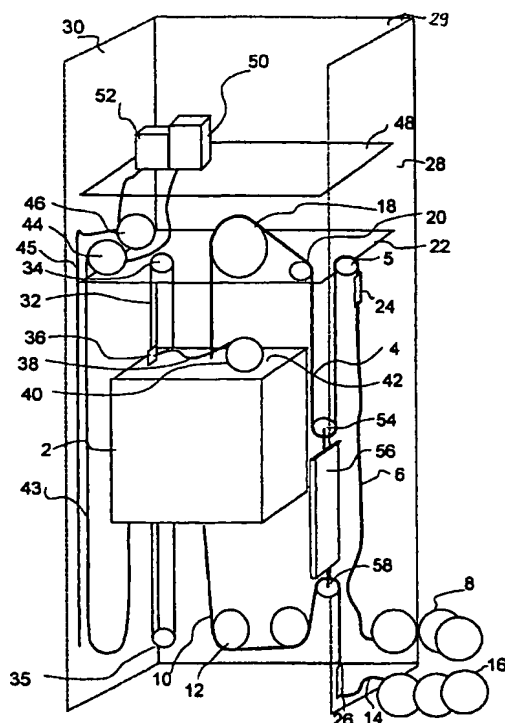
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[Continued on next page]

(54) Title: **ELEVATOR SYSTEM**



(57) Abstract: The invention relates to a system in construction time use of an elevator, said system comprising an elevator car, elevator ropes, a counterweight and a machine room deck with an elevator machine disposed on it. According to the invention, the elevator ropes have been fitted to run from the elevator car to a traction sheave connected to the elevator machine and further via a diverting pulley mounted on the counterweight to the machine room deck. The anchorage of the elevator rope is disposed substantially near the machine room deck and the elevator rope has been arranged to run further to a rope supply outside the hoistway.

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## B. FIELDS SEARCHED

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 07, 31 August 1995 (1995-08-31) & JP 07 097157 A (MITSUBISHI ELECTRIC CORP), 11 April 1995 (1995-04-11) abstract; figures 4-7	1-3,7-12
Y	---	4-6
Y	US 5 033 586 A (RICHARDS DOUGLAS ET AL) 23 July 1991 (1991-07-23) column 5, line 36 -column 6, line 14; figure 1	1-12
Y	---	1-12
Y	DE 10 50 040 B (FA R STAHL) 5 February 1959 (1959-02-05) column 2, line 26 -column 3, line 5; figures 1,2	1-12
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☒ Further documents are listed in the continuation of box C.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 519 101 A (SIEFFERT JOSEPH EDWARD) 7 July 1970 (1970-07-07) column 3, line 30 -column 4, line 52; figures 1-12 ---	1-12
Y	FR 2 694 279 A (OTIS ELEVATOR CO) 4 February 1994 (1994-02-04) page 3, line 27 -page 4, line 4; figures 1,2 -----	1-12

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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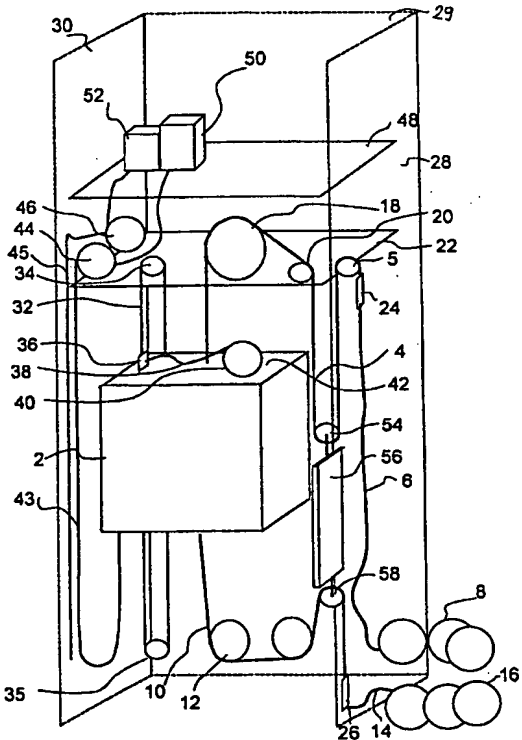
Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 07097157 A	11-04-1995	JP 2705534 B	28-01-1998
US 5033586 A	23-07-1991	EP 0466667 A	15-01-1992
		EP 0670282 A	06-09-1995
		ES 2083558 T	16-04-1996
DE 1050040 B		NONE	
US 3519101 A	07-07-1970	DE 1900971 A	04-09-1969
		FR 2000108 A	29-08-1969
		GB 1194618 A	10-06-1970
		JP 50019821 B	10-07-1975
FR 2694279 A	04-02-1994	NONE	

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<p>(54) Title: ELEVATOR SYSTEM</p> <p>(57) Abstract</p> <p>The invention relates to a system in construction time use of an elevator, said system comprising an elevator car, elevator ropes, a counterweight and a machine room deck with an elevator machine disposed on it. According to the invention, the elevator ropes have been fitted to run from the elevator car to a traction sheave connected to the elevator machine and further via a diverting pulley mounted on the counterweight to the machine room deck. The anchorage of the elevator rope is disposed substantially near the machine room deck and the elevator rope has been arranged to run further to a rope supply outside the hoistway.</p> 		

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## ELEVATOR SYSTEM

The present invention relates to a system in construction time use of an elevator, as defined in the preamble of claim 1.

5 During the construction of high-rise buildings, elevators are needed before the building has been finished. Either the elevators are needed for construction time use or the lower floors are completed before the rest, in which case the elevators serving them must be available for use. As the construction work is advancing, the elevator must be able to  
10 serve as many floors as possible.

For construction time use, so-called jump elevators have been developed, in which the hoisting height of the elevator is increased gradually as the construction work advances. The  
15 elevator machine room is moved to an upper level and the length of the elevator rope is increased correspondingly. A general requirement concerning elevators is that the elevator should be usable in its entirety and with all its properties. Therefore, all other components depending on the hoisting  
20 height, such as the car cables, compensating ropes, overspeed governors and the electrification and electric cables in the hoistway should also be extended through the whole length of the finished hoistway.

From specification US 5,033,586, a solution is known in which  
25 the elevator machine room can be raised to and mounted at a desired height. In this solution, a second deck with a rope supply is disposed above the machine room. When the machine room is to be moved, the elevator car is locked in place so that it remains immovable with respect to the machine room  
30 and the required additional rope length is taken from the rope supply. In this solution, the rope supply must be lifted along with the machine room, an extra deck must be built and a complex apparatus is needed for paying out the additional rope.



The object of the present invention is to achieve an economic elevator for construction time use which, with the progress of construction work, can be easily lifted to a higher working level and which is also suited for use as the regular  
5 elevator of the building. To implement this, the invention is characterized by the features presented in the characterization part of claim 1. Other preferred embodiments of the invention are defined in the subclaims.

The solution of the invention allows easy provision of the  
10 additional rope length needed as the height of the building increases. When the machinery is moved to a new working level, all components of the elevator are always immediately available for use without complicated adjustments or settings. Those portions of the hoist rope and compensating rope  
15 which are not yet in use can be freely disposed in a suitable place, even in a space outside the building. The equipment in the machine room used during construction constitutes the elevator machine room of the finished building as far as applicable.

20 In the following, the invention will be described in detail by the aid of one of its embodiments with reference to the drawings, wherein

- Fig. 1 presents an elevator according to the invention, and
- Fig. 2 presents another elevator according to the inven-  
25 tion.

Fig. 1 illustrates the elevator system of the invention. Mounted in the upper part of the finished part of a hoistway, which is defined by side walls 28 and 30 and a back wall 29, is a machine room deck 22, which carries the elevator drive  
30 machine 18. The drive machine 18 consists of an elevator motor, possibly provided with a gear, and a traction sheave driven by it. An elevator rope 4 has been fitted to run over the traction sheave and attached by one end to the car 2 or

car frame. On the other side of the traction sheave, the elevator rope runs over a diverting pulley 20 and via a diverting pulley 54 mounted in the upper part of the counterweight 56 back to the machine room deck 22, from where the elevator rope 4 is further passed over a diverting pulley 55 and fixed substantially at the level of the machine room deck 22 by means of a clamp 24 fastened to the hoistway or building structures. In this example, the elevator car is implemented using a 1:1 suspension ratio, so the circumferential velocity of the traction sheave corresponds to the velocity of the elevator car. On the other hand, the counterweight is suspended with a ratio of 1:2, so the velocity of the counterweight equals half the circumferential velocity of the traction sheave. Fixed in a known manner to the bottom of the elevator car 2 is a compensating rope 10, which is passed via a diverting pulley 12 in the lower part of the hoistway and via a diverting pulley 58 connected to the lower end of the counterweight to the bottom of the hoistway, where it is fastened to a rope clamp 26. Thus, the compensating rope as well as the elevator rope are suspended with a ratio of 1:1 on the side of the elevator car and with a ratio of 1:2 on the side of the counterweight. As for the hoisting machinery and compensating ropes, the elevator works in the normal manner.

That part 6 of the elevator rope which is not in use during construction hangs freely below the clamp 24 and the extra rope is spooled on rope reels in a rope supply 8. The rope supply is preferably located in the lower part of the building at or below the level of the first temporary position of the machine room deck. Similarly, the extra portion 14 of the compensating rope behind clamp 26 is stored on rope reels in rope supply 16.

The overspeed governor rope 32 is attached by one end to the elevator car and passed via a diverting pulley 35 in the lower part of the hoistway to the overspeed governor wheel 34. The overspeed governor rope 32 is fastened to a clamp 36

on the top of the car and the free rope portion 38 is stored in an overspeed governor rope supply 40 placed on the top 42 of the car.

5 Provided on the machine room deck or on another deck 48 located near it is a space for a control panel 52 and an elevator control unit 50. Deck 48 is connected to deck 22 in such a way that both decks can be raised together as the construction work advances. The supply of electricity to the elevator car and the control of the car equipment are implemented in a  
10 manner known in itself by using a car cable 43, which is connected to the elevator car 2 and to the elevator control unit 50. To allow for future hoisting heights, a car cable supply 44 is provided on the machine room deck 22. Correspondingly, a hoistway cable supply 46 for hoistway wiring 45 is likewise  
15 provided on the machine room deck 22.

Fig. 2 presents another example of an embodiment of the invention, in which the compensating system is implemented using chains 60. In this case, no continuous compensating rope and no rope supply for it are needed, but when the machine  
20 room is moved to a higher level, the compensating chain 60 is extended with the required length of additional chain. In other respects, the arrangement in Fig. 2 corresponds to the solution illustrated in Fig. 1 and corresponding parts are indicated by the same reference numbers as in Fig. 1.

25 When the machine room of the elevator is to be raised to the next level, a procedure as described below is observed. The elevator car is driven in service operation mode to the highest position possible. The counterweight is now in its low position, and it is made fast and locked in place. After  
30 this, the car is secured in place e.g. by locking it to the guide rails or in some other reliable manner. The rope clamps of the hoist rope and compensating rope are released, whereupon the required additional rope length can be paid out from the rope supplies. The rope clamp holding the overspeed gov-

ernor rope is loosened so that the rope can slide during the hoisting of the machine room. The wires connected to the elevator control panel are disconnected.

The elevator machine room and its supporting beams are raised somewhat by means of a crane or construction hoist (not shown), whereupon the supporting means of the machine room structure can be released. The machine room is raised to the next machine room level by means of a hoist or by some other applicable hoisting method. During the raising, the hoist ropes and compensating ropes run freely from the rope reels of the rope supplies. Similarly, a length of overspeed governor rope is spooled off from the overspeed governor rope reel on the top of the elevator car. Likewise, lengths of car and hoistway cable corresponding to the lift are released from the car cable and hoistway cable reels on the machine room deck.

After the machine room deck has been hoisted to the new position, the supporting means of the machine room deck are activated and the machine room supporting beams are reliably secured to the building. The overspeed governor rope is fixed to the top of the car. The elevator car is hoisted to the highest level by means of a hoist or crane, whereupon the hoist ropes and compensating ropes are secured, tightened to the right tension and locked in place by means of rope clamps. The counterweight is released and the car and hoistway cables are secured and connected to the control panel. After this, the elevator is ready to serve the new floors.

In the case of elevators in which the compensating system is implemented using chains, the compensating chain is extended before the machine room deck is hoisted to the new working level.

There are numerous different alternatives for implementing the securing of the car and counterweight during the hoisting of the machine room. Likewise, the hoisting of the machine

- room and the elevator car can be implemented using one of several alternative methods. Similarly, there are several methods applicable for locking the rope in practice during construction time use. The payout of rope from the rope supplies can be similarly effected in various ways. The location of the rope supply can be selected in each building according to the possibilities available. The control panels and control unit in the machine room may also be located on the same level with the hoisting machine.
- 10 Once the building has reached its final height, the construction time machine room together with the hoisting machine and other machine room equipment can be left permanently in place, so that they form a corresponding part of the machine room. The rope supplies and other equipment used temporarily
- 15 during construction are now unnecessary and they are naturally removed.

The above description is not to be regarded as a limitation of the sphere of patent protection, but the embodiments of the invention may be freely varied within the limits defined

20 by the claims.

## CLAIMS

1. System in construction time use of an elevator, said system comprising an elevator car, elevator ropes, a counterweight and a machine room deck with an elevator machine disposed on it, **characterized** in that the elevator ropes have been fitted to run from the elevator car to a traction sheave connected to the elevator machine and further via a diverting pulley mounted on the counterweight to the machine room deck, that the anchorage of the elevator rope is disposed substantially near the machine room deck and that the elevator rope has been arranged to run further to a rope supply outside the hoistway.
2. System as defined in claim 1, **characterized** in that the rope supply is located below the machine room deck.
3. System as defined in claim 1, **characterized** in that the elevator rope coming from the counterweight has been fitted to run over a diverting pulley placed on the machine room deck and that the elevator rope is secured to a fixing point near the traction sheave.
4. System as defined in claim 1, **characterized** in that the system comprises a compensating rope which is secured to the lower part of the elevator car and arranged to run via a diverting pulley below the car to a diverting pulley on the counterweight and further to a clamp securing the compensating rope in the lower part of the hoistway and from the clamp to a compensating rope supply.
5. System as defined in claim 1, **characterized** in that it comprises supplies for the car cable, hoistway wiring and overspeed governor rope.
6. System as defined in claim 1, **characterized** in that the control and operating system of the elevator is disposed substantially in conjunction with the machine room deck.

7. System as defined in any one of claims 1 - 6, **characterized** in that the machine room deck can be raised.

8. System as defined in claim 7, **characterized** in that, when the machine room deck is to be raised, the elevator car and the counterweight can be locked in place so that they can not move.

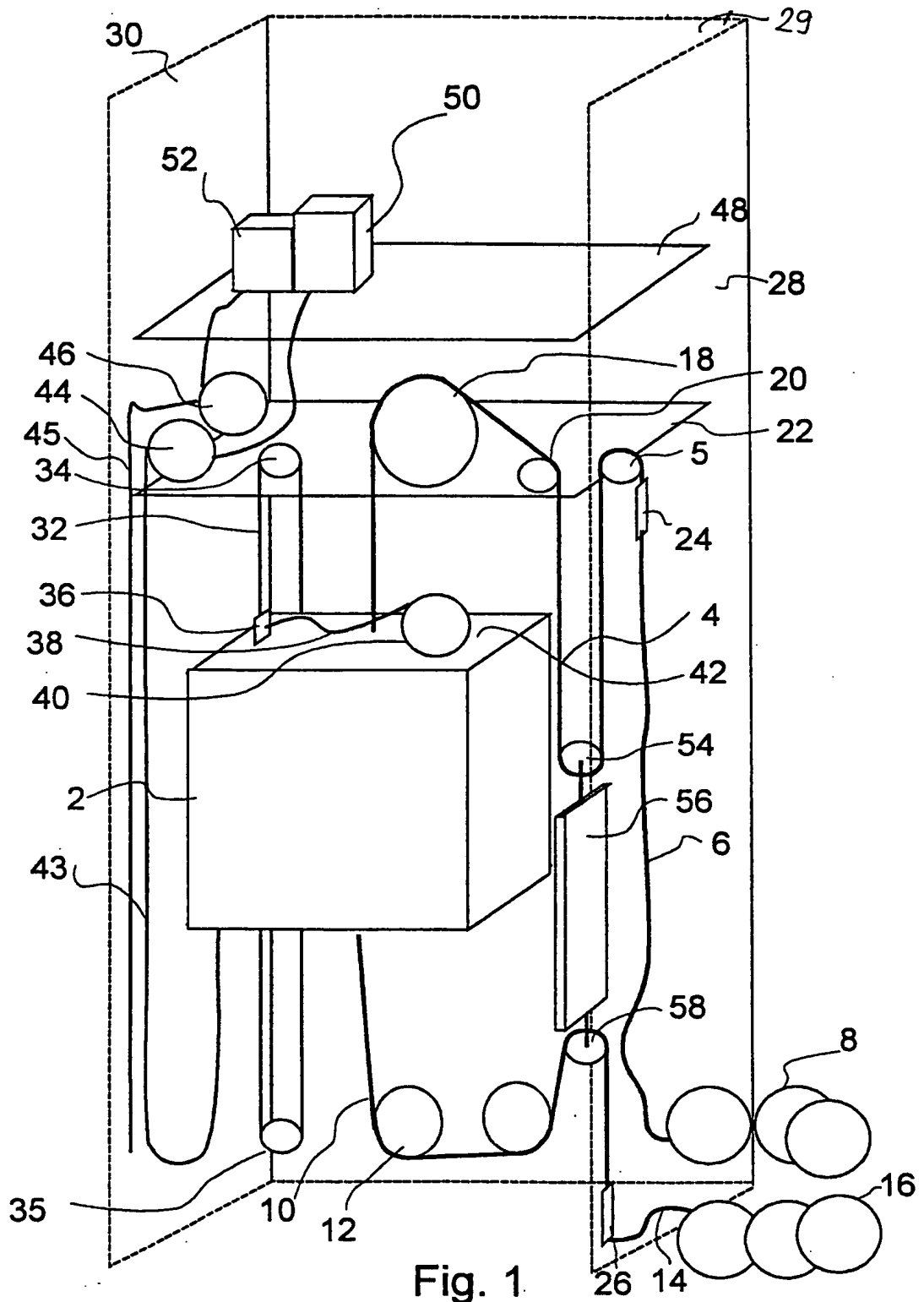
9. System as defined in any one of claims 7 - 8, **characterized** in that the rope supplies can supply a length of rope corresponding to the distance through which the machine room deck is raised.

10. System as defined in any one of claims 1 - 9, **characterized** in that the machine room deck is secured to the building.

11. System as defined in any one of claims 1 - 10, **characterized** in that, when the building reaches its final height, the machine room deck forms the machine room or a part of the machine room.

12. System as defined in any one of claims 1 - 11, **characterized** in that the elevator components used during construction substantially remain parts of the elevator of the completed building.

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2/2

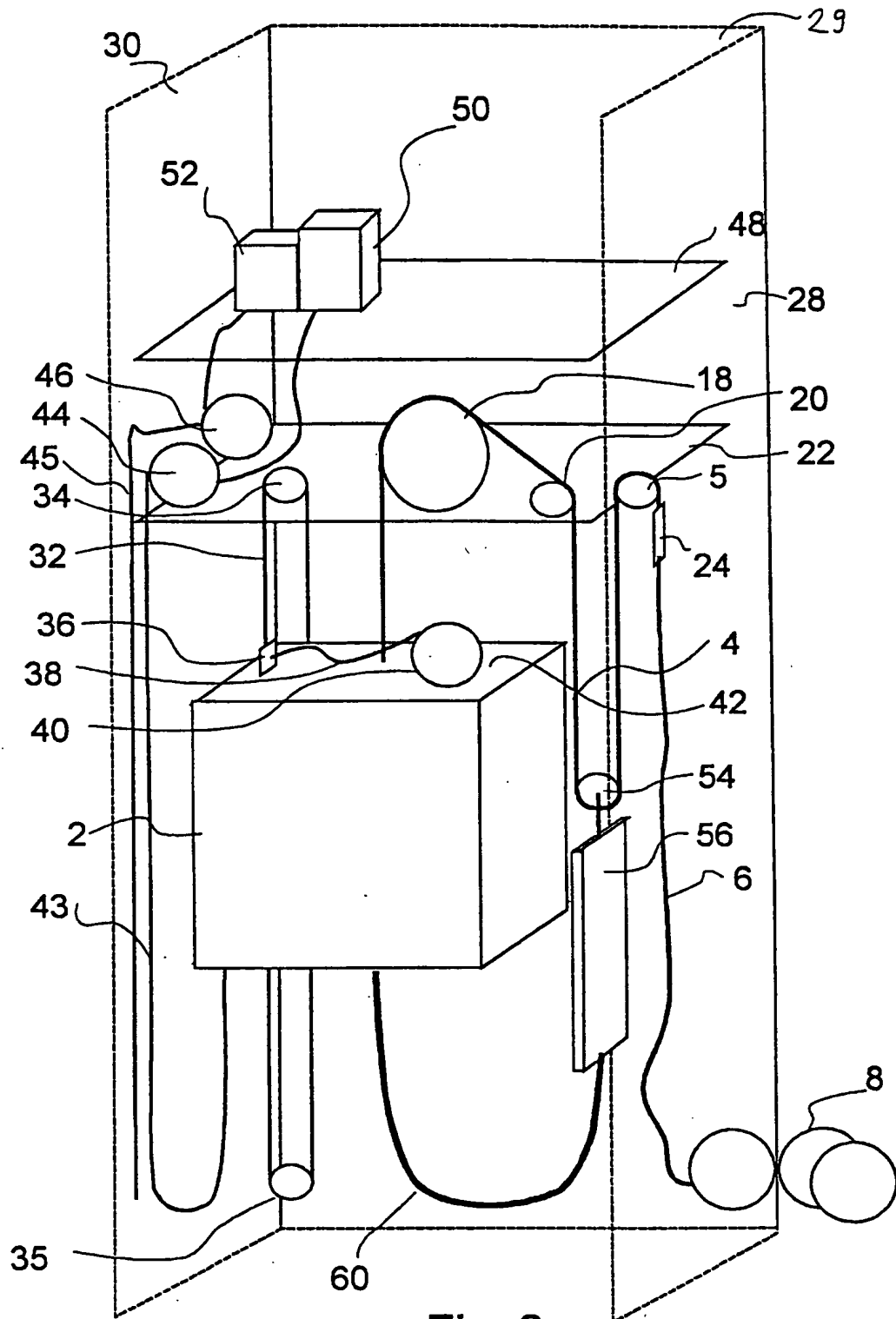


Fig. 2